REMARKS

Claims 7, 10 and 11 are current pending and new claims 13-18 have been added.

Rejection under 35 USC §112 First paragraph

The Examiner has rejected independent method claims 7 and dependent claims 10 and 11 under 35 USC §112, first paragraph, as failing to comply with the written description requirement asserting that (1) that use of exoglycosidases from any *Xanthomonas* is too broad in scope because exoglycosidases have differing structural, chemical and physical characteristics and (2) while the specification discloses fucosidases, mannosidases, xylosidases, glucosidases, galactosidases and hexominidases from *Xanthomonas manihotis* and *Xanthomonas holcicola,* the Examiner asserts that it is not known what other glycosidases could arise with other members of the *Xanthomonas* genus. By introducing specific strains of *Xanthomonas* into claim 7, applicant asserts that it is no longer necessary to itemize the glycosidases in this claim. The previous rejection of vagueness in the office action dated 3/11/2003 when the claim stated "at least one glycosidase from [any] *Xanthomonas*" is not applicable here as the *Xanthomonas* strains have been defined.

Description of the claimed method

(a) Structural, chemical and physical characteristics:

The structural, chemical and physical characteristics of exoglycosidases from 6 *Xanthomonas* species, 3 Bacilli and 1 Bacteroides

have been described in the above application by their source and their biological function. The substrate specificity of these glycosidases were accurately established by means of a novel functional assay for determining substrate specificity and function of exoglycosidases, the assay being described in detail and fully enabled in the application.

Applicants respectfully assert that the specification describes in detail how to obtain exoglycosidases from any *Xanthomonas* strain and how to determine their function for use in modifying carbohydrates. However, to expedite prosecution, applicants have amended the claims to recite only those *Xanthomonas* strains analyzed for glycosidases in Examples 3, 9 and 11. These Examples describe glycosidases isolated and purified from *Xanthomonas manihotis*, *Xanthomonas holcicola*, and *Xanthomonas oryzae*.

The Examiner asserts that different exoglycosidases have structural differences. However, structural differences between exoglycosidases are not relevant to the present claimed methods which rely on purified exoglycosidases obtainable from *Xanthomonas* species where it can be established that individual exoglycosidases have defined substrate (including linkage) specificities (see definitions on page 19 of the application) using the novel screening assay provided in the Examples.

2) While the specification discloses fucosidases, mannosidases, xylosidases, glucosidases, galactosidases, N-acetylglucosamines, and hexominidases from *Xanthomonas strains,* the Examiner asserts that it is not known what other glycosidases could arise with other members of the *Xanthomonas* genus.

Applicants are confused as to why the Examiner identified only two of the six *Xanthomonas* species described in the specification. Not only has the Examiner apparently overlooked the disclosure in Example 9 for *Xanthomonas oryzae* from which 8 glycosidases have been purified and characterized but also the description of glycosidases from other *Xanthomonas* species described in the specification namely *Xanthomonas badrii* (5 glycosidases), *Xanthomonas cyanopsidis* (9 glycosidases) and *Xanthomonas campestris* (3 glycosidases). Moreover, applicants assert that the disclosure is sufficient to support a conclusion that glycosidases can be reliably purified from *Xanthomonas* species (Table 4) in contrast to Bacillus (Table 3) which taken together with the disclosure of how to purify and assay glycosidases to determine substrate specificity including linkages teaches one of ordinary skill in the art how to obtain purified glycosidase of defined substrate specificity from any *Xanthomonas* strain.

To expedite prosecution, applicants have followed the suggestion of the Examiner by limiting the claims to glycosidases obtainable from those *Xanthomonas* strains described in the Examples. Presently amended claim 7 does not list individual glycosidases because these are determined by the term "obtainable from" the strains now specified. The present claims are narrower in scope then the specification provides and applicants so limit the claims without prejudice to subject matter not now claimed.

The Examiner is respectfully requested to reverse the rejection under 35 USC section 112.

Rejection under 35 USC §103

Independent claims 7 and dependent claims 10 and 11 stand rejected under 35 USC 103 as being unpatentable over Ichikawa et al. in view of Frank et al. and Su et al.

Amended independent claim 7 is a method of modifying a carbohydrate that requires selecting at least one purified glycosidase obtainable from *Xanthomonas holcicola*, *Xanthomonas manihotis*, or *Xanthomonas oryzae* that has a defined substrate specificity, cleaving a glycosidic bond and forming a modified carbohydrate.

Ischikawa et al.

Ichikawa describes synthesis, not cleavage of oligosaccharides. Ichikawa uses glycosidases instead of glycotransferases for glycosyl transfer because they are less expensive and do not need sugar donors for synthesis reactions. Ichikawa et al does not teach or suggest using an exoglycosidase of defined substrate specificity for cleavage to modify a carbohydrate. Moreover, Ichikawa does not teach that the glycosidases should be purified.

Frank et al.

Frank et al. describe the general properties of a galactosidase composition from *Xanthomonas campestris* but does not suggest the method described in claim 7 using at least one purified enzyme with a defined substrate specificity from the presently defined *Xanthomonas manihotis, Xanthomanas halcicola* or *Xanthomonas oryzae* for modifying a carbohydrate. Frank et al. describe an extraction and purification protocol for beta glactosidase that depends on a classic but unsatisfactory assay for determining substrate specificity using o-nitrophenyl beta-D-galactoside substrate. Limitations of this assay include an inability to distinguish

different galactosidases and lack of reliability as an indicator for oligosaccharide cleavage activity. (Application on page 21).

Indeed, Table 4 in the above application shows that *X. campestris* isolates produce a glucosidase, a mannosidase and a fucosidase. The results obtained by Frank et al. are inconsistent with Table 4 which is not entirely surprising in light of the nitrophenyl assay used by Frank et al. to make his specificity determination. Moreover, Frank et al. neither suggests nor teaches how a galactosidase may be separated from the other types of glycosidases to form a pure preparation. Instead, Frank et al tests for beta galactosidase only. Consequently Frank et al. therefore does not enable one or more purified exoglycosidase as required in claim 7.

In summary, Frank et al. neither enables the characterization of the glycosidase from *X.campestris* nor because of the deficiencies of the assay used, the defined substrate specificity. The reference does not suggest altering immunogenic properties of the modified carbohydrate.

Su et al.

Su et al. describes cell extracts and cells containing a recombinant beta glucosidase derived from *Xanthomonas albilieans* and not from the *Xanthomonas* strains now identified in claim 7. The purpose of the reference appears to be the industrial use of breakdown products of cellulose. No attempt was made to purify any glycosidase. The recombinant glucosidase was cloned in *E.coli* where the clones were detected by metabolism of cellobiose not normally metabolized by *E.coli* . The plasmid was then transferred to *Z.mobilis* and the whole cells analyzed for their ability to

produce ethanol from cellobiose compared with broken cells similarly transformed.

Ichikawa in view of Frank and Su.

In summary, the Ichikawa reference is directed to synthesis of oligosaccharides, Su et al. is directed to the use of cellulose in a fermentation process to make ethanol and Frank et al. reports on *Xanthomonas campestris* for the specific purpose of Xanthum gum production in a lactose based medium which led in turn to an academic study of what was believed to be a single glycosidase within the limitation of the nitrophenyl assay used.

There is no teaching in any of the references to suggest the combination of the teachings of these references. Nor is there any suggestion that one of ordinary skill in the art at the time would be motivated to combine the references because the three references are directed to diverse areas of science. Finally, if the references were combined, they would not teach the claimed invention. For example, the combination of references do not enable the use of purified glycosidases from the specified *Xanthomonas* strains having defined substrate specificity.

Furthermore, there is no teaching in Ichikawa et al, Frank et al or Su et al. to use an exoglycosidase from *Xanthomonas* to alter immunogenic properties of carbohydrates by cleavage.

Applicants therefore request that the Examiner reverse the rejection of obviousness.

CONCLUSION

For the reasons set forth above, Applicants respectfully request that the rejections set forth in the Official Action of December 1, 2004 be withdrawn and submit that this case is in condition for immediate allowance. Early and favorable consideration leading to prompt issuance of this Application is earnestly solicited.

Applicants petition for a three-month extension of time and enclose a check in the amount of $ 510.00. Please charge deposit account No. 14-0740 for any deficiencies.

Should the Examiner wish to discuss any of the remarks made herein, the undersigned attorney would appreciate the opportunity to do so. Thus, the Examiner is hereby authorized to call the undersigned collect at the number shown below.

Respectfully submitted,

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